STREAM SURVEYS OF THE SHEEPSCOT AND DUCKTRAP RIVER SYSTEMS IN MAINE

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United States Department of the Interior, Fred A. Seaton, Secretary
U. S. Fish and Wildlife Service

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ABSTRACT

As part of a cooperative program to restore Atlantic salmon in Maine, the Fish and Wildlife Service and the Maine Sea Run Salmon Commission made stream surveys to collect information on obstructions to fish, pollution, water temperature, stream flow, and extent of spawning and rearing areas.

In the Sheepscot River system it was found that 14 out of 52 tributaries were seriously obstructed, and 20 had insufficient flows for salmon. Only 3 tributaries were considered to be of any value as salmon spawning and rearing areas. In addition to a very small number of salmon, a few shad, striped bass and alewives are found in the watershed. The abatement of pollution and the creation of adequate flows and passages for fish migration is recommended.

The Ducktrap River was found to have limited potentialities for salmon, the most inimical feature being low stream flows. Out of 19 tributaries, 4 were obstructed and 16 had flows too small for salmon. Only 2 were considered to have any value for salmon spawning and rearing. Provision of adequate passage facilities and the augmentation of flows is recommended.

CONTENTS

	Page
Introduction	1
Acknowledgments	1
Methods	1
Sheepscot River	
General description	1
Width and depth	2
Bottom composition	2
Stream flow	2
Temperatures	6
Obstructions	6
Diversions	6
Pollution	6
Predators	6
Fish present	6
Summary	12
Recommendations	12
Ducktrap River	
General description	12
Width and depth	14
Bottom composition	14
Stream flow	14
Temperatures	14
Obstructions	14
Pollution	14
Predators	14
Fish present	18
Summary	18
Recommendations	18

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The U. S. Fish and Wildlife Service and the Atlantic Sea Run Salmon Commission conducted a cooperative investigation to determine methods for rehabilitating the Atlantic salmon in State of Maine waters. One phase of the program was concerned with stream surveys to collect information on obstructions to fish migration, pollution, water temperatures, and stream discharges. A further objective was to locate and to estimate the amount of spawning and rearing area that could be of use to salmon in each watershed.

This report summarizes the findings for the Sheepscot and Ducktrap Rivers.

John V. Mahoney helped collect data for this paper; J. E. Mason prepared the maps and revised the manuscript. Alden P. Stickney supplied information to make the description of the Sheepscot River and its obstructions correct as of 1956 and provided Figure 2. Acknowledgment is made of the information given and assistance rendered by members of the Lincoln County Fish and Game Association, and in particular to J. White Nichols and Clarence Race for their fact furnishing on the Sheepscot River. Mr. and Mrs. Arthur Oxton and Mr. Mark Wardsworth of Lincolnville Beach, gave much of their time assisting in the Ducktrap River area.

Methods

The procedures followed in these surveys were described in some detail in "A Survey of the Narraguagus River and Its Tributaries" by Floyd G. Bryant (Research Report No. 2, Atlantic Sea Run Salmon Commission). The first step was to classify a river section as either a pool or a riffle. The length and width of this area was then measured or otherwise determined and an estimate made of the percentage of the wetted river bottom covered by gravel classified as boulder rubble (stones larger than 18" in diameter), large rubbe rubble (stones 6-18" in diameter), medium rubble (stones 3-6" in diameter), small rubble (stones 1/4-3" in diameter), and mud and sand (stones or particles less than 1/4" in diameter). The localities of these data were recorded in miles above a designated landmark at or near the mouth of the river. This procedure made it possible to estimate the portions of the stream that were made up of pools or riffles and to estimate the square yards of spawning and/or nursery area in the different stream sections.

Concurrent with the observations on bottom composition, data were recorded on water depth, obstructions, water stage, water temperatures, gradient, pollution, predators, species of fish observed, and such other information as appeared pertinent.

The data relative to bottom composition are subject to errors of measurement, and to errors due to differences between observers and to differences in river discharge volumes on successive survey days. It is believed that these errors were minimized by observer training and that the net result is not of such magnitude as to prevent gross comparison of watersheds. A further limiting factor was that the survey year was the third of three successive years of low precipitation. As a result, the stream bottom normally wet is somewhat larger than indicated by the survey data.

Sheepscot River

General description

The Sheepscot River watershed was surveyed between June 13 and July 17, 1950. The survey started at the Alna (Public Dock) Bridge, defined as the mouth, and proceeded upstream to cover 24.5 miles of flowing water. Inspections of the stream were made at intervals in the succeeding 5.5 miles. The flow in the remaining approximately 9 miles to the

source was considered too small and the channel too inaccessible to warrant the time and expense of a survey. No attempt was made to survey Sheepscot and Long Ponds on the main river, or the many small ponds on the tributaries.

The Sheepscot and its tributaries drain an area of about 228 square miles as shown in figure 1. The main river rises in small springs on Whitten Hill near West Montville at an elevation of about 620 feet. The river flows about 39 miles in a general southwesterly direction to Alna Bridge and then enters a long estuary above the town of Wiscasset in Lincoln County. The water is fresh at Alna Bridge although the effects of high tide were noted about 300 yards above the mouth of Trout Brook about 1.2 miles upstream.

In the lower 15 miles to Coopers Mill, the valley is one-fourth to 2 miles wide with bordering hills that gently slope to the river. The valley widens in the next 5 miles to a width ranging from 3 to 5 miles in the Long Pond and Sheepscot Pond area. Above Long Pond the valley narrows until it is generally from 100 to 300 yards wide from 29 to 35 miles above the mouth of the river. The upper 4 miles are in fairly steep hills with the main stem of the river little more than a spring-fed brook.

Along most of the stream there is a marginal band of thick brush, consisting mostly of alders, willows, poplar, and maple, with some conifers. The streambanks are typically earth and/or gravel. There are exceptions in the swampy areas near the larger ponds and in the sand-bank and ledge-rock outcrops near Head Tide, Whitefield, and Coopers Mills.

The area was once intensively farmed, and many grist and sawmills served the area. These are no longer operating, and many of the farms have been abandoned. Extensive areas are reverting to brush and woodland.

Width and depth

In the 21 miles below the Palermo Fish Hatchery the riffles were generally 20 to 60 feet wide and 2 inches to 1 foot deep. The deadwater sections and longer pools ranged from 30 to 80 feet wide and 2 to 5 feet deep with occasional holes 6 to 12 feet deep. With the exception of Coopers Mill Pond, Long Pond, and Sheepscot Pond, the stream decreased to a width ranging between 6 and 10 feet in the 14 miles above the Palermo Hatchery. The riffle areas ranged from 2 to 6 inches in depth and the pools ranged from 2 to 4 feet in depth with occasional holes up to 10 feet in depth. In the upper 4 miles of the stream the width and depth decreased until the stream was a series of small pocketlike pools and riffles. In the upper mile there was a series of small cascades.

Bottom composition

Table 1 presents a summary of the bottom composition in the pools and riffles in the surveyed sections of the Sheepscot watershed. The areas surveyed for bottom composition were on the main stem of the river and the West Branch only. While the sum of the flows of the numerous small tributaries made up the bulk of the discharge of the system, the individual streams were typically of such limited physical dimensions that they had little or no apparent use as past or potential producers of Atlantic salmon; hence they were not surveyed in detail. Table 2 presents a summary of the small tributaries, along with the factors, i.e. obstructions, total discharge, etc., affecting the stream as a salmon producer.

Stream flow

The survey crew measured the flow of the main river at North Whitefield on June 20, 1950, at 48.4 c.f.s. At this time the West Branch was flowing 17 c.f.s. or about 35 percent of the total river volume.

The records of the North Whitefield gauging station of the U. S. Geological Survey station show that the river discharge has ranged from a maximum of 5,260 second-feet to a minimum of 5 second-feet, with a mean of 206. The peak runoffs are typically in March and April following the spring thaws. The minimum flows

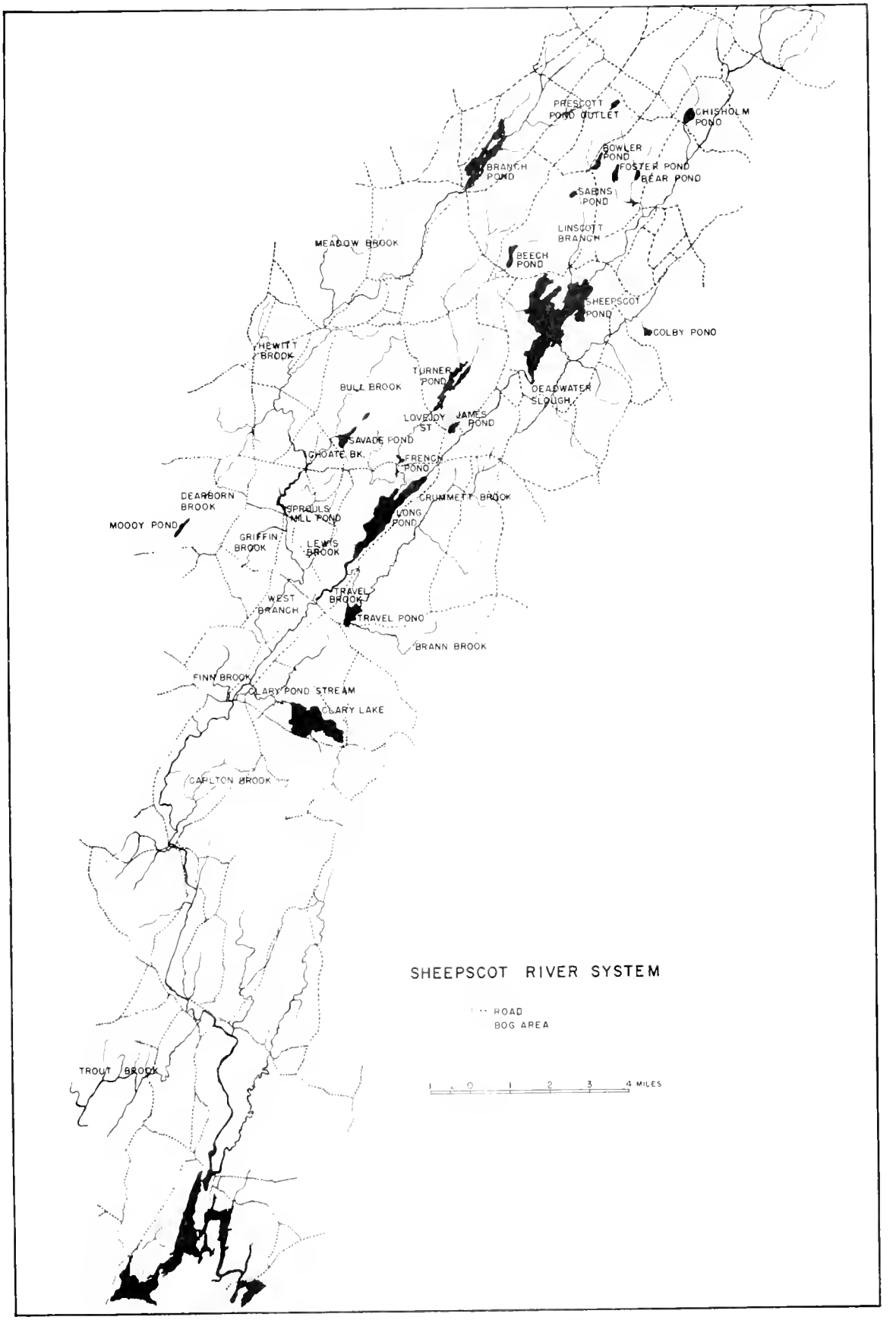

Figure 1.--Map of Sheepscot River

Table 1.- Summary of bottom composition of parts of the Sheepscot River and its principal tributary, the West Branch.

	Miles Above Mouth	TOTAL BOTTOM AREA			BOULDER RUBBLE			LARGE RUBBLE			MEDIUM RUBBLE			SMALL RUBBLE			MUD AND SAND		
		Square Yards	Percent in Pools	Percent in Riffles	Square Yards	Percent in Pools	Percent in Riffles	Square Yards	Percent in Pools	Percent in Riffles	Square Yards	Percent in Pools	Percent in Riffles	Square Yards	Percent in Pools	Percent in Riffles	Square Yards	Percent in Pools	Percent in Riffles
Main River	0-1	47,375	73.9	26.1	88	100.0	0	5,427	66.2	33.8	12,749	71.0	29.0	12,208	64.9	35.1	16,903	85.0	15.0
	1-2	33,955	30.1	69.9	1,921	36.3	63.7	6,889	25.6	74.4	14,584	25.4	74.6	4,440	32.4	67.6	6,121	42.9	57.1
	2-3	32,910	27.3	72.7	3,891	15.1	84.9	4,767	20.6	79.4	9,705	25.6	74.4	7,540	31.1	68.9	7,007	37.2	62.8
	3-4	28,270	36.6	63.4	5,045	10.2	89.8	5,343	9.7	90.3	6,964	29.7	70.3	4,312	48.0	52.0	6,606	78.3	21.7
	4-5	37,610	61.2	38.8	2,135	53.9	46.1	3,234	35.6	64.4	11,316	40.7	59.3	7,992	57.6	42.4	12,733	88.9	11.1
	5-6	43,890	39.0	61.0	7,290	53.6	46.4	7,975	36.6	63.4	15,610	26.9	73.1	7,575	40.8	59.2	5,440	55.0	45.0
	6-7	37,530	100.0	0	0			3,753			7,506	100.0	0	11,259	100.0	0	15,012	100.0	0
	7-8	51,385	79.2	20.8	6,200	67.0	33.0	8,449	58.0	42.0	12,182	79.1	20.9	13,345	85.3	14.7	11,209	94.9	5.1
	8-9	25,200	50.8	49.2	3,160	21.5	78.5	3,370	38.0	62.0	6,570	49.3	50.7	5,190	60.9	39.1	6,910	64.3	35.7
	9-10	27,660	83.7	16.3	905		100.0	3,919	67.9	32.1	6,192	76.6	23.4	7,281	93.8	6.2	9,363	95.2	4.8
	10-11	44,127	61.2	38.8	3,014	15.0	85.0	5,792	33.3	66.7	9,994	43.3	56.7	9,515	64.4	35.6	15,812	89.6	10.4
	11-12	41,400	79.1	20.9	3,319	47.8	52.2	7,072	70.7	29.3	7,534	53.4	46.6	3,626	77.1	23.9	19,849	97.6	2.4
	12-13	28,675	91.0	9.0	572	34.1	65.9	2,041	59.6	40.4	3,699	78.8	21.2	6,548	97.1	2.9	15,815	97.5	2.5
	13-14	19,410	49.3	50.7	424	76.9	23.1	4,547	51.9	48.1	7,544	38.2	61.8	3,460	48.7	51.3	3,435	67.1	32.9
	14-15	31,070	47.1	52.9	7,855	24.6	75.4	6,183	32.2	67.8	8,002	45.1	54.9	4,090	58.8	41.2	4,940	95.2	4.8
	15-16	53,950	100.0	0	5,395	100.0	0	2,898	100.0	0	5,395	100.0	0	5,795	100.0	0	34,467	100.0	0
	16-18	Long pond not surveyed.																	
	19-20	14,250	70.7	29.3	360	0	100.0	1,168	4.5	95.5	2,293	19.4	80.6	1,033	50.3	49.7	9,396	96.4	3.6
	20-21	59,300	100.0	0	1,190	100.0	0	2,380	100.0	0	3,220	100.0	0	2,680	100.0	0	49,830	100.0	0
	21-22	16,025	83.3	16.7	100	0	100.0	28	0	100.0	1,600	39.8	60.2	2,529	52.6	47.4	11,768	96.7	3.3
	22-23	14,595	17.0	83.0	1,889	5.2	94.8	3,197	6.5	93.5	4,966	18.1	81.9	2,285	18.1	81.9	2,258	38.2	61.8
	23-24	17,990	1.0	99.0	2,384			5,160	0.5	99.5	4,580	0.6	99.4	3,632	0.8	99.2	2,234	4.3	95.7
	24-27	Sheepscot pond not surveyed.																	
	27-28	66,600	100.0	0	0			0			6,660	100.0	0	6,660	100.0	0	53,280	100.0	0
	28-29	25,200	100.0	0	0			0			2,520	100.0	0	2,520	100.0	0	20,160	100.0	0
	29-30	9,986	84.0	16.0	125	100.0	0	125	100.0	0	509	68.8	31.2	1,580	63.5	36.5	7,647	88.8	11.2
	30-30.5	8,539	47.7	52.3	456	36.8	63.2	1,331	29.0	71.0	2,651	36.5	63.5	2,180	47.3	52.7	1,920	79.2	20.8
Total	24.5	816,902	70.1	29.9	57,718	40.3	59.7	95,048	44.3	55.7	174,545	51.6	48.4	139,276	68.5	31.5	350,315	91.8	8.2
Percent		100.0			7.1	2.8	4.2	11.7	5.2	6.5	21.3	11.0	10.3	17.1	11.7	5.4	42.9	39.4	3.5
West Branch	0-1	24,800	50.1	49.9	3,994	28.9	71.1	7,030	22.4	77.6	5,633	58.4	41.6	3,451	64.4	35.6	4,692	88.9	11.1
	1-2	27,975	75.4	24.6	589	0	100.0	1,636	7.0	93.0	2,207	32.5	67.5	1,695	42.4	57.6	21,848	89.4	10.6
	2-3	30,220	100.0	0	0	0	0	338	100.0	0	1,827	100.0	0	1,827	100.0	0	26,228	100.0	0
	3-4	29,465	94.0	6.4	330	47.3	52.7	764	44.5	55.5	972	52.5	47.5	3,272	90.4	9.6	24,127	98.3	1.7
	4-5.1	26,261	70.9	29.1	970	49.2	50.8	5,281	60.4	39.6	7,801	64.0	36.0	3,745	65.6	34.4	8,464	88.6	11.4
Total	5.1	138,721	79.3	20.7	5,883	30.4	69.6	15,049	36.9	63.1	18,440	61.5	38.5	13,990	72.8	27.2	85,359	95.1	4.9
Percent		100.0			4.2	1.3	3.0	10.8	4.0	6.8	13.3	8.2	5.1	10.1	7.3	2.7	61.5	58.5	3.0
Watershed Total	29.6	955,623	71.4	28.6	63,601	39.4	60.6	110,097	43.3	56.7	192,985	52.6	47.4	153,266	68.9	31.1	435,674	92.5	7.5
Percent		100.0			6.7	2.6	4.0	11.5	5.0	6.5	20.2	10.6	9.6	16.0	11.0	5.0	45.6	42.2	3.4

Table 2.--A summary of conditions limiting Atlantic salmon production in tributaries of the Sheepscot River.

Name of Tributary	Miles Above Mouth	Obstructed by Man-made Structure	Insufficient Flow for Salmon Migration	Estimated Discharge c.f.s.	Of Little or No Value to Salmon
Trout Brook	0.8		x	1.0	x
Unnamed Tributary	1.7	x	x	1.0	x
Five Unnamed Tributaries	1.7-6.3		x	1.0	x
Carlton Brook	6.7		x	1.5	x
Three Unnamed Tributaries	9.4-10.2		x	1.0	x
Finn Brook	11.0		x	1.0	x
Clary Pond Stream	11.4	x		---	x
Clary Pond				---	x
West Branch of Sheepscot	12.6	x		28	
Lewis Brook	3.5			1.0	x
Griffin Brook	4.7	x	x	3.0	x
Sprouls Mill Pond	5.2	x			x
Choate Brook	6.8			2.0	x
Bull Brook			x		x
Savade Pond			x		x
Dearborn Brook	9.3				x
Moody Pond					x
Hewitt Brook	10.5				x
Unnamed Tributary			x		x
Meadow Brook	12.8			1.0	x
Branch Pond	18.4	x			x
Prescott Pond Outlet	22.4	x		1.0	x
Travel Brook	15.8				x
Travel Pond					x
Black Brook					x
Crummett Brook					x
Brann Brook					x
Long Pond	16.0				?
Lovejoy Stream	18.4		x	5.0	x
Dodge Pond		x			x
French Pond		x	x		x
Turner Pond		x	x		x
James Pond Outlet	20.7				x
James Pond					x
Unnamed Tributary	22.2				x
Sheepscot Pond	24.0			20.0	?
Colby Brook	25.6				x
Deadwater Slough				3.0	x
Beech Pond Outlet	26.1		x		x
Beech Pond					x
Linscott Branch	26.7		x	2.0	x
Sabins Pond		x			x
Bowler Pond Outlet			x		x
Bowler Pond		x			x
Tobey Brook	29.9		x	1.0	x
Jump Pond Outlet					x
Foster Pond		x			x
Bear Pond		x			x
Chisholm Pond Outlet	32.0		x	1.0	x
Chisholm Pond					x
Unnamed Tributary	34.8		x		x
Unnamed Tributary	36.6		x		x

usually occur in September and October after prolonged dry periods. Figure 2 shows the seasonal trend for 1956.

Temperatures

Observed water temperatures of the main river ranged from 62° F. to 75° F. during the period of survey. These observations have been supplemented by a more extensive series of thermal data recorded on a thermograph. The daily water temperatures for part of a single year are shown in figure 2. Other thermograph records have been made in various sections of the river at other times. Temperatures seldom exceed 80° F. except in the quiet sections of the river, particularly the tidal portion. The highest recorded temperature was 88° F., an extreme of only a few hours' duration.

Obstructions

Table 3 presents a summary of past and present obstructions to fish migration, their location, description, possible effects, and recommendations for treatment. There are 11 such sites on the main river, 4 on the West Branch, and 9 on the other tributaries. Seventeen of the 24 obstructions to fish migration were man-made.

Diversions

There are no diversions that remove water from the watershed. There have been mills where the water has been bypassed through turbines for power production only to be returned to the river. At present the Palermo Hatchery withdraws some 2,000 g.p.m., of cool water from below the surface of Sheepscot Pond. This water is returned to the river after passing through the hatchery.

Pollution

Garbage dumps were found along the stream about 950 yards above Alna Bridge and at Whitefield and Coopers Mill. Below Sprouls Mill Dam on the West Branch some of the riffles were cluttered with tin cans and other debris.

Sawdust was observed along the banks at 9.1, 11.3, and 13.3 miles above the mouth; that at 11.3 miles apparently was carried in from Chases Mill on Clary Stream in past years.

Predators

The only salmon predators, other than fish, observed in the watershed were American mergansers. The Sheepscot serves not only as a feeding area but as a breeding area of these birds.

Fish present

The various species of fish seen during the survey are shown in table 4, along with the stream sections where they were observed. Relatively few salmonoids or warm-water game fish other than pickerel were seen. Chub, dace, shiners, and minnows seemed particularly abundant in some areas.

A few shad (Alosa sapidissima), striped bass (Roccus saxatilus), and Atlantic salmon are taken in sport or commercial fisheries in the Sheepscot or its estuary. The reported numbers vary from none to six or so for each species per year.

The earlier records indicate that the Sheepscot was probably the best producer of Atlantic salmon of the many small streams found between the Kennebec and Penobscot Rivers. The highest recorded catch before 1948 was that of 1872 when "12 to 15 salmon" were caught. Since then the numbers on record have varied from none to four per year. Since 1948, the river has been stocked annually with from 10 to 30 thousand young salmon. The returns have been rather small and erratic; although about 12 were caught on hook and line in 1954 and at least as many more ascended the river to spawn. Some of the latter were caught the following spring as kelts. A counting weir has recently been constructed by the U. S. Fish and Wildlife Service to obtain information on the migration and survival of salmon.

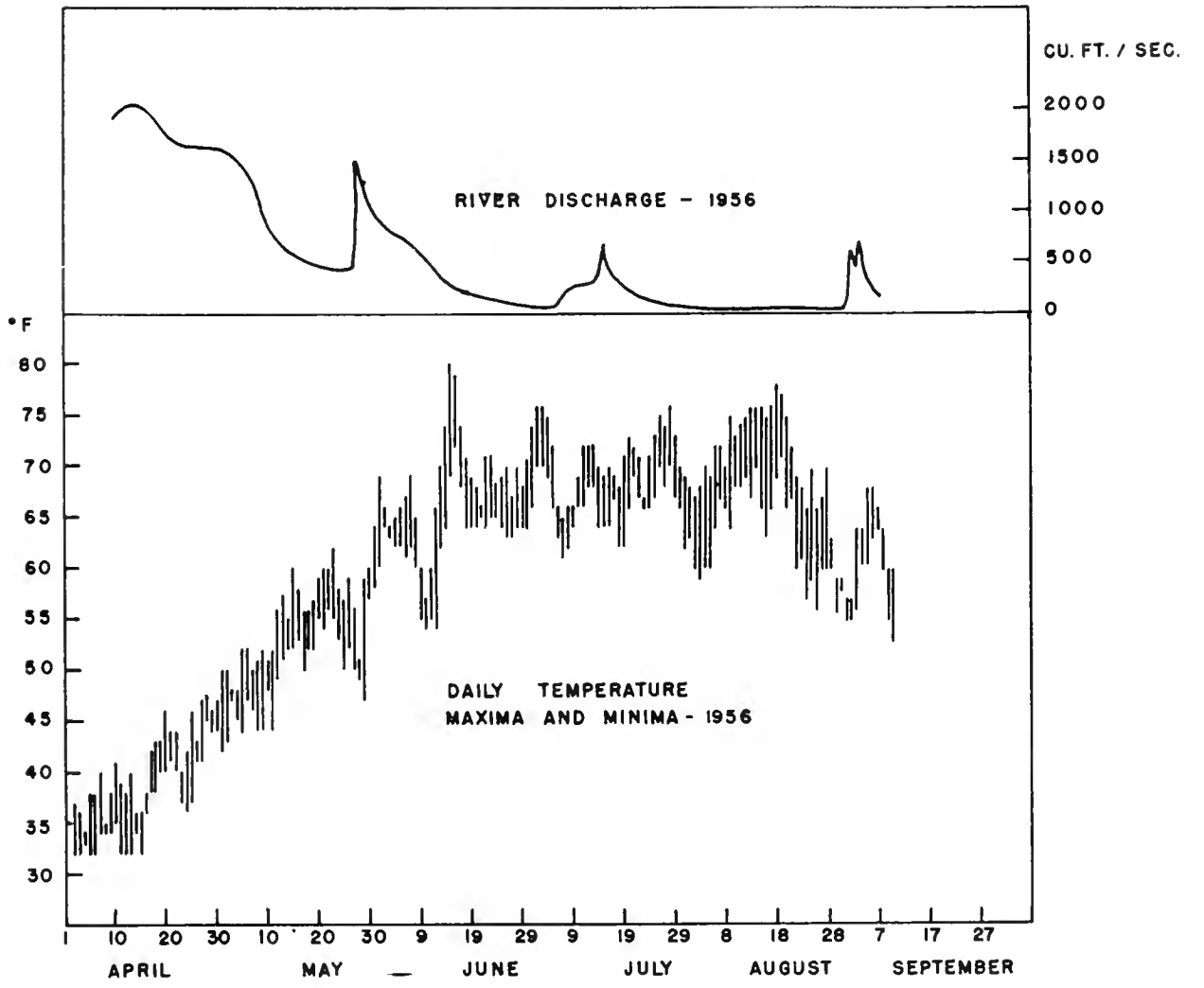

Figure 2.--Daily water temperatures and discharge volume of the Sheepscot River for the spring and summer of 1956.

Temperatures recorded at Whitefield, Maine.
Discharge recorded at Alna, Maine.

Table 3.--Past and present obstructions to salmon migrations in the Sheepscot River watershed.

Name or Type	Location	Description	Effects	Recommendations
MAIN RIVER				
Counting weir	0.7 Miles above Alna Bridge	Slat-type weir with upstream and downstream traps	None when properly tended	None
Head Tide Dam	2 Miles above Alna (Puddle Dock) Bridge	11 foot high concrete roll top dam with sluiceways at right and left banks.	Barrier only at extremely high or low water levels. Left hand sluiceway has been lowered to allow passage of fish at normal low and moderately high water levels.	Keep passages free of debris. Fishway desirable but not necessary.
Kings Mill Dam	Whitefield at 6 miles above Alna Bridge	3-9 foot high concrete dam	No longer serious obstruction	None
Eel Weir	10.9 Miles above Alna at North Whitefield	Slat type weir	None. Has not been installed for several years.	None
Coopers Mill	14½ Miles above Alna Bridge at Coopers Mill	10 foot high boulder and granite dam	Barrier at most water levels	Fishway improvement
Fish Screen	15 Miles above Alna Bridge at the "Basin"	Concrete and iron slats	None in recent years	None
Mill Dams	19.7 Miles above Alna Bridge	Two rock filled crib dams reported 8-12 feet high	None for many years	None
Rock Dam	20.0 Miles above Alna	1 foot high piled rock dam	Barrier at low water	Open a channel through

Table 3.--(Continued)

Name or Type	Location	Description	Effects	Recommendations
Shallow Channel	20.7 Miles above Alna Bridge	Broad flat weed choked channel	Difficult passage	Open a channel and maintain
Two Beaver Dams	21.1 Miles above Alna Bridge	8" and 2½' high active Beaver Dams	Barrier at low water levels	Further study
Hatchery Dam	23.8 Miles above Alna Bridge at Palermo Hatchery	51" high roll top concrete dam	None when fishway regulated	Regulate fishway
Mill Dams	Two, formerly located 30½ miles up	Piled rock	None for many years	None
WEST BRANCH				
Ledge Rock Rapids	235-460 Yards above mouth	Cascades and falls over ledge rock	Difficult passage at low water	Channelization
Sprouls Mill Dam	5.2 Miles above mouth of West Branch	8½-9 foot stone dam	None. H as been breached. A small, home-made, stone and log dam just below it may provide a barrier at low water.	Remove small dam
Weeks Mill Dam	12.2 Miles up	Stone dam reported 6 feet high, now breached	Difficult passage at low water	Deepen channel
Branch Mill (Dinsmore Mill)	18.4 Miles up at outlet of Branch Pond	8-10 foot high stone dam	Barrier	Remove, or install fishway

Table 3.--(Continued)

Name or Type	Location	Description	Effects	Recommendations
TRIBUTARY STREAMS				
Unnamed Tributary	1.7 Miles up main river	Natural falls at mouth of stream	Barrier	Further study
Clary Pond Stream	11.4 Miles up main river	6' dam at Chases sawmill 200 yds. above mouth of stream	Barrier	Further study
Clary Pond Stream	Above Chases sawmill	6-8 foot high water storage dam	Barrier	Further study
Griffin Brook	4.7 Miles up West Branch	Natural falls $\frac{1}{2}$ mile above mouth	Barrier at low water	Further study
Lovejoy Stream	18.4 Miles up main river	Dodges Shingle Mill Dam 3/4 mile above mouth 8' high	Barrier	Further study
Lovejoy Stream	Frenches Mill Dam 1.2 miles up Lovejoy Stream	8-10 foot high stone dam	Barrier at least at low water levels	Further study
Lovejoy Stream	Colby's Mill Dam 2.7 miles up Lovejoy Stream	11 feet high	Barrier	Further study
Linscott Brook	26.7 Miles up main river	Cascade area about 1 mile above mouth	Barrier at low water	Further study
Outlet Stream from Foster Pond	Enters Tobey Brook 24.9 miles up main river	Natural falls	Barrier	Further study

Table 4.—Fish observed and their location during the survey of the Sheepscot River Watershed.

Name	Sheep-scot R.	Trout Brook	West Br.	Lewis Brook	Savade Pond	Prescott Pond	Sheepscot Pond	Bowler Pond	Chisholm Pond
Alewife (Pomolobus pseudo harengus)	x								
Bass, Small Mouth (Micropterus dolomieu)	x						x	x	
Blueback (Pomolobus aestivalis)	x								
Bullhead, Brown (Ameiurus nebulosus)	x								
Chub, Creek (Semotilus atromaculatus)	x		x		x				
Dace (Cyprinidae)	x								
Eel (Anguilla bostoniensis)	x								
Killifish (Fundulus)	x		x						
Lamprey (Petromyzon marinus)	x								
Perch, Yellow (Perca flavescens)	x								x
Perch, White (Morone americana)	x								x
Pickerel, Chain (Esox niger)	x		x		x				x
Salmon, Atlantic (Salmo salar salar)	x								
Salmon, Landlocked (Salmo salar sebago)	x								
Shiners (Cyprinidae)	x		x			x			
Suckers, White (Catostomus commersonnii)	x								
Sunfish (Lepomis sp.)									x
Trout, Brown (Salmo trutta)	x	x	x	x					
Trout, Eastern Brook (Salvelinus fontinalis)	x		x		x				

Summary

From tables 1 and 2 it may be seen that of the 52 tributaries of the main river, 14 are listed as having obstructions to fish migration at or near the mouth of the stream, 20 of the 52 had insufficient flow for salmon migration, 49 of the streams were deemed of little or no value as spawning or rearing areas, while an additional two were of questionable value. Only the West Branch in addition to the main river was thought to have material value as a possible salmon producing area.

Reference to table 3 will show that there are 20 locations where fish migration is either obstructed or questionable. Seven of these locations are on the main river; the most severe are Head Tide Dam, Kings Mill Dam, and Coopers Mill Dam.

From the above information it is apparent that the Sheepscot River has a fairly small watershed with comparatively small discharges other than during the peak-run-off periods. The low flows that prevail during the period when adult salmon may be migrating upstream make the obstructions even more hazardous and extensive. While these obstructions do aid in supplementing minimum flows from the reservoir effect of stored water, it is apparent that this contribution is negligible in those areas which may presently be considered accessible to salmon on even rare occasions.

The available history indicates that a few shad, striped bass, and alewives, as well as Atlantic salmon, may be found in the watershed. It is not now possible to state whether all of these anadromous species were native to the area or were strays into the area. The presence of the alewife may be of importance in view of their role in the economy of other sections of Maine. The rather extensive pond and lake areas indicate the possibility of developing a local alewife fishery that may become of value. This possible extension of the alewife as well as other anadromous runs of fish cannot be made in the face of existing barriers to fish migration.

Recommendations

The following recommendations are made as a result of the survey:

1. That adequate fish-passage facilities be provided at Head Tide Dam and at other obstructions in the river as needed for possible extension of the anadromous fishery resources of the watershed.

2. That creation or extension of water impoundments be investigated as a means of supplementing normal stream flows during low-water seasons.

3. That fish-passage facilities and other improvements be developed as multiple-purpose projects particularly with the thought of creating a commercial alewife fishery as well as improving the status of Atlantic salmon and other anadromous species.

4. That the dumping of garbage and sawdust into the river and its tributaries be stopped.

The Ducktrap River

The Ducktrap River and its tributaries were surveyed on July 10 to 13, 1950, by Floyd G. Bryant and John V. Mahoney. The survey extended from the mouth where U. S. Route 1 crossed the river near Lincolnville to the site of an old mill 6.7 miles above the mouth. Above this area the prolonged drought had reduced the stream flow to a point where it was impossible to determine normal stream characteristics. Areas below Tilden Pond were inspected, as were parts of tributaries where the flow was insufficient to justify the time and expense of a survey.

General description

The Ducktrap River as shown in figure 3, runs from its source in Tilden Pond for about 10 miles in a southeasterly direction to empty into Penobscot Bay near Lincolnville. The watershed drains an area of about 36 square miles.

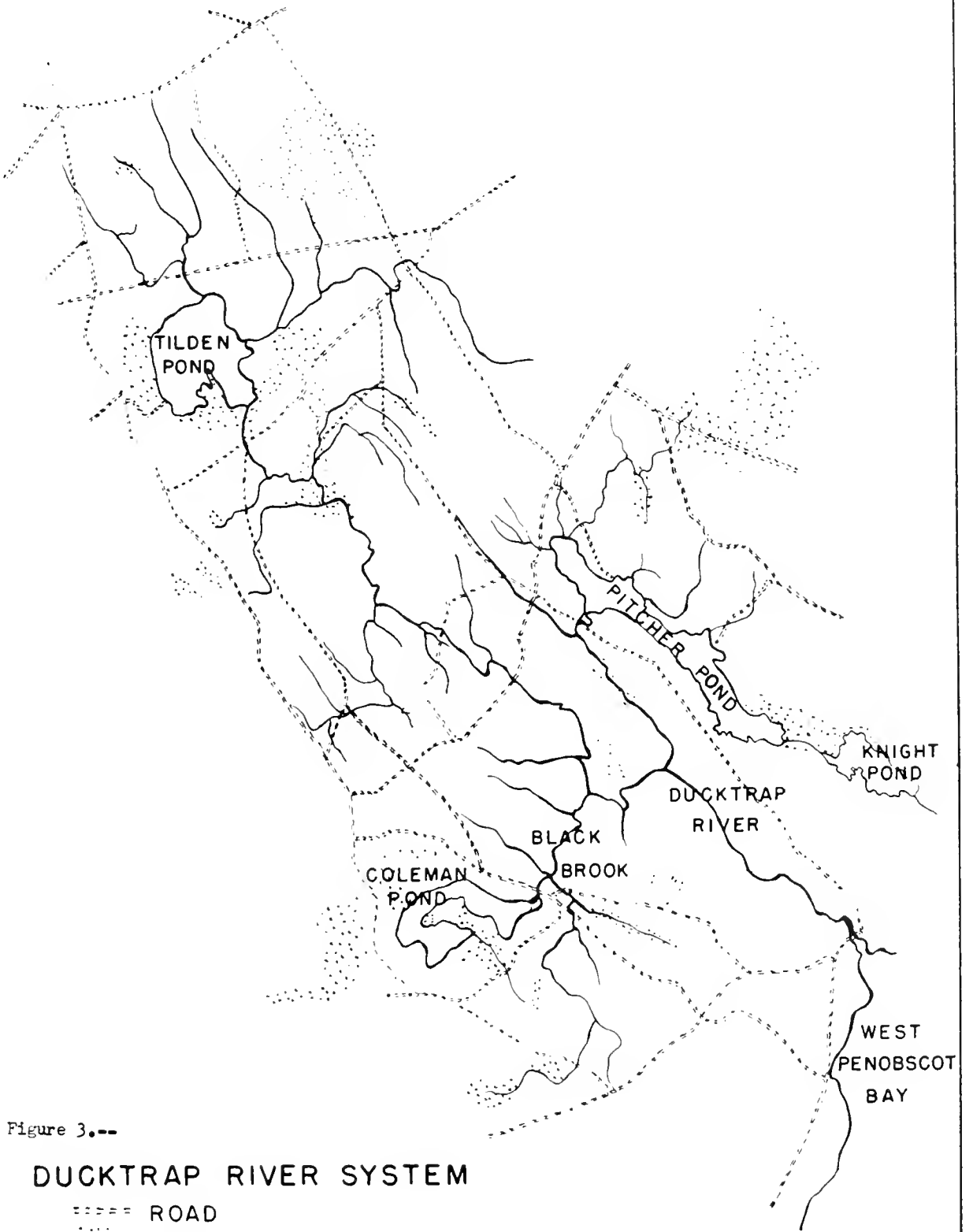
TILDEN POND
PITCHER POND
KNIGHT POND
DUCKTRAP RIVER
BLACK BROOK
COLEMAN POND
WEST PENOBSCOT BAY
DUCKTRAP RIVER SYSTEM
ROAD
BOG
1/2 0 2

Figure 3.--

The watershed is generally rugged and hilly throughout its area. In the lower mile the river banks rise sharply from the stream to a height often exceeding 100 feet. The banks rise to heights of about 200 feet in the next mile and a half upstream. The valley is wider and flatter in the area from 2.5 to 4.0 miles up with the hills again closing in above the 4-mile point. From 6 to 8 miles up there are rugged banks ranging from 350 to 600 feet in height. The upper 2 miles of the stream and Tilden Pond are in a saucerlike flat where several meadows and swampy areas occur.

Most of the watershed is covered with second- and third-growth alder, willow, birch, maple, beech, oak, pine, spruce, and fir, which usually extends to the water's edge. The many abandoned farms are reverting to brush and to forest growth.

Width and depth

In the lower 3 miles the stream channel ranged from 20 to 50 yards in width, but drought had so reduced the stream flow that only one-third to one-half of the channel was water-covered. Above the 3-mile point the water depth ranged up to 3 inches in a channel ranging from 3 to 5 feet in width. In these sections the normal stream channel appeared to be 10 to 30 feet wide. In some areas, particularly in the upper sections of the stream, there was scarcely any flow above the surface of the gravel although the water was normally 2 to 5 inches deep. Most of the pools were less than 3 feet deep, although many ranged up to 6 feet deep in sections well shaded by bank growths or brush and trees.

Bottom composition

The composition of the bottom in pools and riffles is summarized in table 5. Here again, as with the Sheepscot River data, the figures are believed to be conservative due to the drought conditions.

Stream flow

The survey party estimated the stream flow at 5 to 8 c.f.s. just above tidewater, 2 to 3 c.f.s. at a point 3 miles above the mouth and 1 to 2 c.f.s. at 5 miles up. The flow was intermittent from the 7-mile point to about 300 yards below Tilden Pond which had an outflow of 1 to 2 second-feet.

Temperatures

Water temperatures ranging from 65° F. to 83° F. were recorded during the period of the survey. The high temperature of 83° F. was recorded in Kendal Brook, a short distance below the outlet of Pitcher Pond, and clearly showed the heating effect of sunshine on the surface of the pond.

In the main river a maximum temperature of 79° F. was recorded below the outlet of Tilden Pond. The temperature dropped in the shaded areas further downstream to reach a recorded low of 65° F. at a point about 5 miles above the mouth.

Obstructions

Obstructions to fish migration in the Ducktrap and its tributaries are summarized in table 6. A brief description of the barriers is given along with their effects and recommendations on their possible alteration. A total of 12 barriers to fish migration have existed at one time or another. Three of the obstructions no longer exist, but the remaining 9 need alteration if full protection to migrating fish is to be provided.

Pollution

The only pollution noted was the effluent of the sewer outlet from a summer camp 2.8 miles above the mouth. The stream was clouded for about one-half its width and extending downstream for about 50 yards.

Predators

The only predators observed other than fish were two mergansers, one mink, and a few kingfishers.

Table 5.—A summary of the bottom composition of surveyed stream sections in the Duck Trap River watershed.

	Miles Above Mouth	TOTAL BOTTOM AREA Square Yards	Percent in Pools	Percent in Riffles	BOULDER RUBBLE Square Yards	Percent in Pools	Percent in Riffles	LARGE RUBBLE Square Yards	Percent in Pools	Percent in Riffles	MEDIUM RUBBLE Square Yards	Percent in Pools	Percent in Riffles	SMALL RUBBLE Square Yards	Percent in Pools	Percent in Riffles	MUD AND SAND Square Yards	Percent in Pools	Percent in Riffles
Main River	0-1	44,440	32.6	67.4	9,682	15.0	85.0	13,332	32.6	67.4	13,332	32.6	67.4	4,772	60.8	39.2	3,322	43.6	56.4
	1-2	20,810	6.4	93.6	7,867	6.9	93.1	5,657	5.9	94.1	3,739	5.8	94.2	2,370	4.7	95.3	1,177	10.7	89.3
	2-3	23,585	67.7	32.3	2,563	22.2	77.8	1,560	31.0	69.0	2,314	45.2	54.8	2,757	68.8	31.2	14,391	83.2	16.8
	3-4	15,130	71.4	28.6	36	100.0	-	1,196	91.3	8.7	648	19.8	80.2	1,721	62.8	37.2	11,529	73.4	26.6
	4-5	9,180	36.8	63.2	617	1.3	98.7	521	7.1	92.9	1,787	28.2	71.8	2,065	50.5	49.5	4,190	42.6	57.4
	5-6	9,660	16.6	83.4	1,232	13.1	86.9	2,127	14.1	85.9	4,321	16.1	83.9	1,404	18.4	81.6	576	31.8	68.2
	6-6.7	5,955	75.7	24.3	145	100.0	-	538	40.5	59.5	974	41.9	58.1	1,134	66.1	33.9	3,164	94.3	5.7
Total	6.7	128,760	40.5	59.5	22,142	13.2	86.8	24,931	27.3	72.7	27,115	27.1	72.9	16,223	49.6	50.4	38,349	70.3	29.7
Percent		100.0			17.2	2.3	14.9	19.4	5.3	14.1	21.1	5.7	15.4	12.6	6.2	6.4	29.8	20.9	8.8
Kendal	0-1	7,425	1.6	98.4	2,408	0.5	99.5	2,026	1.2	98.8	1,717	2.8	97.2	908	1.3	98.7	366	6.6	93.4
Stream	1-2	4,820	73.4	26.6	158	0	100.0	313	8.6	91.4	489	27.6	72.4	712	61.1	38.9	3,148	93.5	6.5
Total	2.0	12,245	29.9	70.1	2,566	0.5	99.5	2,339	2.2	97.8	2,206	8.3	91.7	1,620	27.6	72.4	3,514	84.4	15.6
Percent		100.0			21.0	0.1	20.9	19.1	0.4	18.7				13.2	3.7	9.6	28.7	24.2	4.5
Watershed									25.2	74.8	29,321	25.7	74.3	17,843	47.6	52.4	41,863	71.5	28.5
Total	8.7	141,005	39.5	60.5	24,708	11.8	88.2	27,270	4.9	14.5	20.8	5.3	15.5	12.7	6.0	6.6	29.7	21.2	8.5
Percent		100.0			17.5	2.1	15.4	19.3											

TABLE 6. PAST AND PRESENT OBSTRUCTIONS ON THE DUCKTRAP RIVER AND ITS TRIBUTARIES

Name or Type	Location	Description	Affects	Recommedations
Fish weir	About 250 yds. up from mouth	Wire and net alewife weir	Barrier when in operation	Provide salmon passage
Ledge Chute	1.2 Miles up	Ledge outcrop drops 4 feet in 30 feet	Barrier at low water levels	Channelization
Turner Falls	2.0 Miles up	Ledge rock area 270 yds. long	Barrier at low water levels, Nearly all spawning area located above	Channelization
Log and Debris	4.0 Miles up	Log and debris jam	Barrier at low water levels	Removal
Former Dam	6.1 Miles up	Unknown	Past Barrier Presently a barrier at low water levels	Channelization
Former Mill Dam	6.2 Miles up	Granite dam over 6 feet high	Former barrier	None

TABLE 6 (Cont.) PAST AND PRESENT OBSTRUCTIONS ON THE DUCKTRAP RIVER AND ITS TRIBUTARIES

Name of Type	Location	Description	Affects	Recommendations
Former Mill Dam	6.7 Miles up	Granite blocks	Former Barrier	None
Morses (Dickey Mill Dam)	9.4 Miles up	6' - 8' high stone dam	Former Barrier	None
Riffles & Bars	Upper three miles	Nearly dry stream section	Low water migration barrier	Improve flow
Kendal Brook cascade area	½-1 mile above mouth of Brook	Rock and ledge area cascades	Barrier at low water levels	Improve flow
Dam	Outlet of Pitcher Pond	8 foot high rock dam	Former barrier presently a low water barrier	Clean out debris & improve flow
Coleman Pond Dam	Outlet of Coleman Pond	3 foot high rock dam	Barrier	Install fishway

Fish present

A run of alewives usually occurs in Tilden and Pitcher Ponds in the spring of the year. Many of the resultant young are landlocked in the pond areas during drought periods.

Schools of small shiners, chub, dace, and suckers were seen from 2 to 7 miles above the mouth in the deeper pool areas. An occasional smallmouth bass was noted, as were small brook trout.

The available history shows that the Ducktrap supported a run of Atlantic salmon at one time. So far as can be determined, there have been no runs of any magnitude or of any consistency for more than a decade. None were caught in a weir operated about 3 miles above the mouth of the river in either 1949 or 1950.

Efforts have been made in recent years to establish a run of silver salmon (Oncorhynchus kisutch) in the watershed by means of hatchery plants of fingerlings. (In November 1952, two Atlantic salmon females and 21 silver salmon were seined from the mouth and liberated upstream where the flow was sufficient to allow fish to swim. There is no indication to date that the runs are firmly established).

Summary

The Ducktrap River has a small watershed with a limited potential for producing Atlantic salmon as compared with other, larger streams in the State of Maine. It is apparent from the above data that the stream flows, even in favorable precipitation years are one of the features most inimical to salmon production.

Table 7 is a summary of observations on the tributaries to the main river. The table shows that of the 19 tributaries 4 were blocked by man-made obstruction, 16 were considered to have too small a flow to provide adequate navigation water for salmon, and 17 were considered to be of little or no value to salmon production in the form of spawning or nursery area. One of the streams was of questionable value and one was considered of some value.

Table 6 lists 12 past or present obstructions to fish migration, of which 7 would require alteration to provide an adequate migration route. It was apparent that the low discharges enhanced the effectiveness of the obstructions.

The observed water temperatures in the portions of the main river where there was an appreciable water flow appeared favorable for production of salmon. In addition, many portions of the main river appeared favorable not only for spawning but as nursery areas for salmon, providing they were made more accessible.

Recommendations

The survey of the Ducktrap River has shown that low stream flows and obstructions are the most inimical features to production of Atlantic salmon.

It may be possible to develop Tilden, Pitcher, Knight, and Coleman Ponds as water-storage areas for augmenting the normal stream flow during low-flow or drought seasons.

Some of the ponded areas presently have a small run of alewives which may possibly be materially increased if the areas were made accessible.

The following recommendations are made with the belief that any conservation measure undertaken should be of a type that would provide for multiple species development of the fishery resources of the watershed:

1. Provide adequate fish-passage facilities at obstructions.

2. Investigate the possibility of developing the ponded sections of the watershed as reservoirs to augment the normal stream flow during low-flow periods.

Table 7. A summary of certain observations on tributaries of the Ducktrap River.

Name of Tributary	Miles Above Mouth	Obstructed by Man-Made Structure	Insufficient Flow for Salmon Migration	Estimated Discharge c.f.s.	Of Little or No Value to Salmon
Kendal Brook	2.4	x		2	
S. W. outlet of Pitcher Pond	0.3	X	x	0	x
Unnamed Tributary	1.9		x	0 +	x
Pitcher Pond	2.0	x	x	2	?
Knight Pond thoroughfare	4.6		x	0	x
Knight Pond			x	0	x
Unnamed Tributary	3.0		x	0 +	x
Black Brook	3.5			2	x
Coleman Pond Outlet	0.9		x	1	x
Coleman Pond	1.0	x	x	1	x
Unnamed Tributary	3.8		x	0 +	x
Unnamed Tributary	5.3		x	0 +	x
Tucker Brook	6.8		x	1.0	x
Unnamed Tributary	8.2		x	0 +	x
Unnamed Tributary	8.5		x	0 +	x
Unnamed Tributary	8.6		x	1	x
Tilden Pond	9.0			1	x
Unnamed Tributary			x		x
Unnamed Tributary			x		x

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